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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 09/917,842 | 07/27/2001 | Barry L. Chin | 5017/ISM/CORE MCVD/SB | 3573 |

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| EXAMINER | |
|---|---|
| KOSOWSKI, ALEXANDER J | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2125 | |

DATE MAILED: 09/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/917,842 | CHIN ET AL. | |
| | Examiner | Art Unit | |
| | Alexander J. Kosowski | 2125 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *13 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-11,13-15,17-36,38-47 and 49-54* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11,13-15,17-36,38-47 and 49-54* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 July 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/17/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

1) Claims 1-11, 13-15, 17-36, 38-47, and 49-54 are presented for examination in light of the amendment filed 6/13/05. This is a second non-final rejection.

### *Claim Rejections - 35 USC § 112*

2) The claim rejections under 112 from the previous office action are withdrawn in light of the amendment filed 6/13/05.

### *Claim Rejections - 35 USC § 102*

3) The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4) Claims 20-24, 26-34, 36, 38, 42-47 and 50 are rejected under 35 U.S.C. 102(e) as being unpatentable by Sandhu (U.S. PGPUB 2002/0195056).

Referring to claim 20, Sandhu discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another, at least one of said regions being adapted to support deposition of a monolayer upon a surface of a substrate (Paragraph 0035), and a wafer support disposed in the deposition chamber and having a horizontal wafer supporting surface, wherein the wafer support is moveable between the two or more interconnected deposition regions (Paragraph 0043-0046 and Figure 5).

Referring to claim 21, Sandhu discloses that at least one of the regions is sealed to minimize the intermixing of deposition gases within two or more deposition regions (Paragraph 0035).

Referring to claims 22-24, Sandhu teaches that said chamber further comprises an orifice for each of said deposition regions, each orifice adapted to provide process and purge gas to a respective deposition region (Paragraph 0030).

Referring to claim 26, Sandhu teaches that the deposition regions may be positioned side by side (Figure 5).

Referring to claim 27, Sandhu teaches that one deposition region is adapted to support deposition of a second monolayer (Paragraph 0045).

Referring to claim 28, Sandhu teaches that at least one deposition region is adapted to support deposition via chemisorption (Paragraph 0008).

Referring to claim 29, Sandhu teaches an apparatus comprising a deposition chamber wherein the deposition chamber is divided into one or more deposition regions that are integrally interconnected to one another (Paragraph 0035), at least one of said deposition regions being adapted to support deposition of a first monolayer upon a surface of a substrate and at least one of said deposition regions being optionally sealable from the other deposition regions (Paragraph 0035); and a wafer support disposed in the deposition chamber and configured to support the substrate horizontally, wherein the wafer support is moveable between two or more interconnected deposition regions (Paragraph 0043-0046 and Figure 5).

Referring to claim 30, see rejection of claim 27 above.

Referring to claim 31, see rejection of claim 21 above.

Referring to claims 32, see rejection of claim 22 above.

Referring to claims 33-34, see rejection of claims 23-24 above.

Referring to claim 36, see rejection of claim 26 above.

Referring to claim 38, see rejection of claim 28 above.

Referring to claim 42, Sandhu teaches an apparatus comprising a deposition chamber body having a sealable port configured for horizontal entry and egress of a substrate (Paragraph 0043-0046 and Figure 5), at least two or more deposition regions defined in the chamber body, at least a first deposition region of said deposition regions is adapted to support vertical deposition of a first monolayer upon a surface of a substrate (Paragraph 0035), and a wafer support disposed in the deposition chamber, wherein the wafer support is moveable between two or more interconnected deposition regions (Paragraph 0043-0046 and Figure 5).

Referring to claim 43, Sandhu teaches that at least one of said deposition regions is sealable from the other deposition regions (Paragraph 0035).

Referring to claim 44, Sandhu teaches that a second deposition region is adapted to support deposition of a second monolayer (Paragraph 0045).

Referring to claim 45, Sandhu teaches that the regions are sealed to minimize intermixing of deposition gases between the regions (Paragraph 0035).

Referring to claims 46-47, see rejection of claims 22-23 above.

Referring to claim 50, Sadhu teaches that the deposition regions are positioned side by side (Figure 5)

***Claim Rejections - 35 USC § 103***

5) The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6) Claims 1, 5-9, and 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran (U.S. Pat 6,455,098), further in view of Gornicki (U.S. Pat 6,200,441).

Referring to claim 1, Tran discloses an apparatus comprising a deposition chamber, wherein the deposition chamber is divided into two or more deposition regions that are integrally connected to one another (col. 2 lines 12-35), and a wafer support disposed in the deposition chamber, whereby the wafer support is vertically moveable between the two or more interconnected deposition regions (col. 3 lines 16-28). However, Tran does not explicitly teach that the apparatus comprises a vacuum deposition chamber.

Gornicki teaches a sequential vacuum deposition apparatus comprising multiple integrally connected chambers whereby a wafer support moves substrates between the chambers for vacuum deposition processing (col. 2 lines 8-17 and Figure 1).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a vacuum deposition chamber in the apparatus taught above since vacuum deposition chambers are commonly used to deposit a succession of thin film layers on a substrate (Gornicki, col. 1 lines 39-46).

Referring to claims 5-6, Tran discloses that the deposition regions are integrally connected with an aperture and that the aperture is sealed to minimize the intermixing of deposition gases between the regions (col. 2 lines 12-35).

Referring to claims 7-8, Tran teaches a gas supply panel coupled to the deposition chamber wherein the gas supply panel includes gas supply lines (col. 7 lines 32-63 and Figure 3).

Referring to claim 9, Tran teaches a gas exhaust pump coupled to the chamber (col. 6 lines 9-17)

Referring to claim 13, Tran teaches that the first and second deposition regions are vertically stacked (col. 3 lines 35-45 and Figure 1).

Referring to claims 14-15, Tran discloses first and second orifices for providing process gas to first and second deposition regions and that the first orifice may be disposed vertically above the second orifice (col. 7 lines 32-63 and Figure 3).

7) Claims 10-11, 17-19, 25, 35, 39, 40-41, and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu, further in view of Tran.

Referring to claim 10, Sandhu discloses a method of depositing a material layer on a substrate comprising positioning a wafer on a wafer support in a deposition chamber comprising a first and second deposition region, wherein the first and second deposition regions are integrally connected to one another, and wherein the wafer support is moveable between the first and second deposition regions (Paragraph 0035), introducing a first deposition gas into the first deposition region and a second deposition gas into the second deposition region (Paragraphs 0043-0045), moving the wafer support with the substrate thereon into the first deposition region

wherein a first monolayer of the deposition gas is chemisorbed onto the surface of the substrate, transporting the substrate thereon into the second deposition region wherein a first monolayer of the second deposition gas is chemisorbed on the first monolayer of the first deposition gas, and repeating until a desired thickness is achieved (Paragraph 0043-0046). However, Sandhu does not explicitly teach changing the elevation of the wafer support to transport the substrate into the second deposition region.

Tran teaches a method of depositing material on a substrate comprising a multiple integrally connected deposition regions (col. 7 lines 13-31), whereby a wafer support is capable of being elevated to move a substrate between the deposition regions (col. 3 lines 16-28).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a wafer support capable of elevating a substrate in the invention taught by Sandhu since allowing a wafer support to move in an upward and downward motion creates a small amount of post exposure convection within the second processing environment and helps to quickly replenish processing chemicals at the reaction surface of the wafer and thereby helps to improve the throughput of the chemical processing step (Tran, col. 3 lines 39-44).

Referring to claim 11, the claim varies from claim 10 in that it claims a software routine executed on a computer storage medium rather than a method. The rejected method of claim 10 could inherently be executed via a software routine on a computer storage medium. Therefore, referring to claim 11, see rejection of claim 10 above.

Referring to claim 17, Sandhu discloses a method of depositing a material layer on a substrate comprising positioning a substrate on a substrate support in a deposition chamber comprising a first deposition region and a second deposition region, wherein the first and second

deposition regions are integrally connected to one another (Paragraph 0035), depositing a first monolayer on the substrate disposed in the first deposition region, moving wafer to the second deposition region, and depositing a layer on the wafer in the second deposition region (Paragraph 0043-0046). However, Sandhu does not explicitly teach elevating the wafer support to transport the substrate into the second deposition region.

Tran teaches a method of depositing material on a substrate comprising a multiple integrally connected deposition regions (col. 7 lines 13-31), whereby a wafer support is capable of being elevated to move a substrate between the deposition regions (col. 3 lines 16-28).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a wafer support capable of elevating a substrate in the invention taught by Sandhu since allowing a wafer support to move in an upward and downward motion creates a small amount of post exposure convection within the second processing environment and helps to quickly replenish processing chemicals at the reaction surface of the wafer and thereby helps to improve the throughput of the chemical processing step (Tran, col. 3 lines 39-44).

Referring to claim 18, Sandhu teaches depositing a second monolayer on the substrate in the second deposition region (Paragraph 0045).

Referring to claim 19, Sandhu discloses that first and second gases are introduced into the first and second deposition regions to form monolayers (Paragraphs 0043-0046).

Referring to claim 25, Sandhu teaches the above. However, Sandhu does not explicitly teach that one of said deposition regions may be vertically stacked above another of said deposition regions.

Tran teaches a method of depositing material on a substrate comprising a multiple integrally connected deposition regions (col. 7 lines 13-31), whereby the regions are stacked vertically and substrate moves between them (col. 3 lines 16-28).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to stack deposition regions in the invention taught by Sandhu since allowing a wafer support to move in an upward and downward motion creates a small amount of post exposure convection within the second processing environment and helps to quickly replenish processing chemicals at the reaction surface of the wafer and thereby helps to improve the throughput of the chemical processing step (Tran, col. 3 lines 39-44).

Referring to claim 35, see rejection of claim 25 above.

Referring to claim 39, Sandhu teaches flowing a purge gas into at least one of the integrally connected deposition regions between the introduction of the first and second deposition gases (Paragraph 0028).

Referring to claim 49, see rejection of claim 25 above.

Referring to claim 40, Sandhu teaches the above. However, Sandhu does not explicitly teach moving the substrate support vertically.

Tran teaches a method of depositing material on a substrate comprising a multiple integrally connected deposition regions (col. 7 lines 13-31), whereby a wafer support is capable of being elevated to move a substrate between the deposition regions (col. 3 lines 16-28).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to move the substrate support vertically in the invention taught by Sandhu since allowing a wafer support to move in an upward and downward motion creates a small amount of

post exposure convection within the second processing environment and helps to quickly replenish processing chemicals at the reaction surface of the wafer and thereby helps to improve the throughput of the chemical processing step (Tran, col. 3 lines 39-44).

Referring to claim 41, Sandhu teaches moving the substrate support horizontally (Paragraph 0043).

8) Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu, further in view of Tran, further in view of Gornicki.

Referring to claim 51, Sandhu and Tran teach the above. However, they do not explicitly teach that the deposition chamber is a vacuum deposition chamber.

Gornicki teaches a sequential vacuum deposition apparatus comprising multiple integrally connected chambers whereby a wafer support moves substrates between the chambers for vacuum deposition processing (col. 2 lines 8-17 and Figure 1).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a vacuum deposition chamber in the apparatus taught above since vacuum deposition chambers are commonly used to deposit a succession of thin film layers on a substrate (Gornicki, col. 1 lines 39-46).

9) Claims 52-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandhu, further in view of Gornicki.

Referring to claims 52-54, see rejection of claim 51 above.

10) Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran, further in view of Gornicki, further in view of Matsukawa et al (U.S. Pat 5,518,542).

Referring to claim 2, Tran and Gornicki disclose the apparatus shown above. However, they do not explicitly teach a piston coupled to the wafer support for moving the wafer support between the two or more interconnected deposition regions.

Matsukawa teaches a wafer support whereby a piston is used to raise and lower the wafer (col. 7 lines 39-46).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a piston in the apparatus taught above since using a piston in conjunction with a wafer support allows the wafer to be moved to multiple vertical positions (Matsukawa, col. 7 lines 39-54). In addition, it is noted that using a piston is a well known method for lifting a platform.

11) Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran, further in view of Gornicki, further in view of Okase et al (U.S. Pat 6,497,767).

Referring to claim 3, Tran and Gornicki teach the above. However, they do not explicitly teach a heater wherein the heater is adapted to control the temperature of the wafer support.

Okase teaches the use a built-in heater in a wafer support (col. 2 lines 29-31).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize a heater in the invention taught above since this would allow a constant temperature to be maintained in the supporting body (Okase, col. 2 lines 29-31).

12) Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran, further in view of Gornicki, further in view of Doering et al (U.S. Pat 6,387,185).

Referring to claim 4, Tran and Gornicki disclose the apparatus shown above. However, they do not explicitly teach that the wafer support is an electrostatic chuck.

Doering teaches a deposition apparatus whereby a wafer in a processing chamber may be secured via an electrostatic chuck (col. 9 lines 48-51).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize an electrostatic chuck in the apparatus taught above since clamping a substrate to an electrostatic chuck prevents backside deposition of the substrate (Doering, col. 7 lines 21-24).

***Response to Arguments***

13) All arguments are rendered moot in view of the new rejection above.

***Conclusion***

14) The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sinha (U.S. Pat 5,384,008) – teaches a wafer deposition apparatus.

Wang (U.S. Pat 6,281,098) – teaches a multiple zone deposition apparatus.

Washburn (U.S. Pat 6,139,695) – teaches a serial deposition apparatus.

15) Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander J Kosowski whose telephone number is 571-272-3744. The examiner can normally be reached on Monday through Friday, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Leo Picard can be reached on 571-272-3749. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. In addition, the examiner's RightFAX number is 571-273-3744.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Alexander J. Kosowski
Patent Examiner
Art Unit 2125

LEO PICARD
SUPERVISORY PATENT EXAMINER
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